

REMARKS

PROVISIONAL ELECTION

In the Office Action, the Examiner indicates that this application contains claims directed to the following species:

- the species of figures 1-5,
- the species of figures 6 and 7,
- the species of figures 10 and 11,
- the species of figures 12-15,
- the species of figures 16 and 17,
- the species of figures 18 and 19,
- the species of figures 20 and 21,
- the species of figure 22,
- the species of figures 23-25B, and
- the species of figures 26-28B.

It is noted that Figures 8-9 are not included in any of the species designated by the Examiner.

Applicant elects the species of Figures 1-5.

Such species are readable on claims 1, 2, 3, 9, 10, 11, 12, 13 and 14.

TRAVERSE

The Examiner considers that "these species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1".

The Applicant respectfully disagrees and considers that all the species are linked to form a single general inventive concept.

The non-elected species all comprise the features defined in the main claim, and shown in Figures 1-5, i.e., effectively a "thermal diode." More particularly, the instant device is designed to provide heat transfer between a first wall and a second wall respectively in contact with a first thermal mass and a second thermal mass.

Such a device may be used in particular for transferring heat between a wall capable of being heated by solar radiation and another wall such as, for example, a wall of a building, a water reservoir, etc. In this case, one of the thermal masses is the external ambient air, whereas the other thermal mass is the building, reservoir, etc.

Referring to claim 1, the device comprises an insulating unit 12 capable of being interposed between the first wall 14 and the second wall 16 in order to define a closed loop for the circulation of a heat-exchanging fluid (FC). The loop comprises a first channel 28 extending substantially vertically along the first wall 14 and a second channel 30 extending substantially vertically along the second wall 16. The first channel 28 and the second channel 30 are staggered with respect to one another in the vertical direction in order to define a "low channel" and a "high channel", as well as an upper channel 32 connecting the first channel 28 and the second channel 30 and a lower channel 34 connecting the first channel 28 and the second channel 30.

Due to this configuration, the device operates as follows :

- the circulation of the heat-exchanging fluid (FC) is effected naturally in the loop when the low channel is at a higher temperature than the high channel, which permits a heat transfer,
- the circulation of the heat-exchanging fluid (FC) is naturally blocked in the loop when the low channel is at a lower temperature than the high channel, which prevents heat transfer by forming a thermal insulator.

As noted above, such a device can be called a "thermal diode" by analogy to the electrical arts. The circulation of the heat exchanging fluid is effected or blocked naturally by the convention of the heat-exchanging fluid.

Details of the operation of the device may be found particularly on page 2, last paragraph, and on page 3, first paragraph of the specification.

These main features are present in all of the embodiments (all of the species) of the

instant invention.

Figures 6-9 are related to an embodiment of the instant device in the form of a shutter; figures 10 and 11, figures 12-15 and figures 16 and 17 are related to constructions where the circulation channels of the heat-exchanging fluid may optionally be blocked; figures 18 and 19 are related to modifying the direction of the thermal diode; figures 20 and 21 disclose another embodiment where the device is in the form of stacked elements; figure 22 is directed to an embodiment for heating a liquid; and figures 23-25B and figures 26-28B disclose an embodiment for changing the direction of the thermal diode.

As noted above, all these figures disclose embodiments which are closely related to the embodiment of figures 1-5 and apply the same operating principle.

Novelty

It is believed that the instant device patentably distinguishes from Zelek (US patent 4 540 042) for at least the following reasons.

Zelek discloses a fluid thermal storage and transfer unit including a fluid conduit filled with a fluid which is substantially all of the same state. The cross section of the conduit has generally the form of a parallelogram and defines a loop having first and second axial sections which are disposed at different elevations. Referring particularly to figure 1, the convection loop 10 has opposed generally parallel sides 12, 14, the side 12 being lower than the side 14. A bottom 16 and a top 18 are generally parallel and are disposed in oblique relationship to the horizontal.

However, the reference fails to disclose an insulating unit, a first channel, a second channel, an upper channel, and a lower channel, as recited herein. In the Zelek device, there is also no structure for defining these respective channels.

The presence of channels in the instant device defines a loop of circulation, as seen, for instance, by the arrows of figure 1. Zelek neither teaches nor suggests the above features and the

advantages resulting therefrom.

CONCLUSION

In light of the above remarks, it is respectfully submitted that claims 1-14 should now be examined together and that they are now in condition for allowance.

If any additional fee is required in connection with the filing of this Response, please charge same to our Deposit Account No. 19-3935.

Finally, if there are any formal matters remaining after this Response, the undersigned would appreciate a telephone conference with the Examiner to attend to these matters.

Respectfully submitted,

STAAS & HALSEY LLP

Date: _____

2/6/04

By: _____

[Signature]
William F. Herbert

Registration No. 31,024

1201 New York Avenue, NW, Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500